THE

ONTARIO WATER RESOURCES

COMMISSION

WATER POLLUTION SURVEY

of the

CITY OF ORILLIA

COUNTY OF SIMCOE

1970

REPORT

ON A

WATER POLLUTION SURVEY

OF THE

CITY OF ORILLIA

COUNTY OF SIMCOE

August, 1970

DISTRICT ENGINEERS BRANCH

DIVISION OF SANITARY ENGINEERING

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INTRODUCTION

A water pollution survey of the City of Orillia was conducted during the weeks of August 9 and 23, 1970. The survey was made at the request of the municipality to locate sources of pollution and to determine the effects on the receiving streams. When sources of pollution are found, corrective action is recommended by the Ontario Water Resources Commission. Where water works and/or pollution control works appear desirable or expansions to present facilities are necessary, the Commission has a program to aid in the construction of these works.

The information and assistance received from the Simcoe County Health Unit, the Orillia Water, Light and Power Commission, and the City Engineering Department is gratefully acknowledged.

I SUMMARY AND CONCLUSIONS

A water pollution survey of the City of Orillia was conducted in August, 1970.

The City of 21,000 has a municipal water works serving almost the entire population.

Domestic wastes from approximately 85% of the population are directed to a 4.0 MGD conventional activated

sludge plant with final effluent discharged to Mills Creek. The plant is providing satisfactory treatment from an organic and bacteriological point of view. The municipality is serviced by separate sewer systems. Outlying areas of the City not connected to the sewage collector system rely on individual septic-tank and tile-field systems for sewage treatment. A five-year program is in progress to service these areas with sanitary sewers.

Storm drainage from the municipality is mostly directed to Lake Simcoe and Lake Couchiching. Bacteriological and chemical samples collected from the sewer outfalls and drainage ditches indicated that domestic wastes are gaining access to a great portion of the storm drainage system. The areas in concern are the Canice, Neywash, Coldwater, Mississaga, Colborne, Queen East streets storm sewers and the Cedar Island Road drainage ditch. These all drain to Lake Couchiching.

Ben's Ditch and Mills Creek draining to Lake Simcoe were found to be contaminated bacteriologically upstream from the municipal water pollution control plant due to domestic wastes gaining access to the creek via the storm drainage system. Downstream from the plant however, it was found that Mills Creek, Lake Simcoe and Kitchener Park Beach were bacteriologically safe for swimming purposes. The reason being is that the chlorine

in the final plant effluent is actually disinfecting the stream.

In general, the bacteriological quality of Lake Simcoe and Lake Couchiching is satisfactory except for localized areas mentioned in the report.

Industrial waste discharges to Ben's Ditch do not pose much of a water pollution problem as most of the industrial wastes are directed to the municipal sanitary sewer system. Where there are existing problems the industries are endeavouring to connect up to the sanitary sewers. However, there still may be unknown discharges of industrial wastes to the storm sewer system. Ben's Ditch and Mills Creek is to be dredged to remove the black sediment of past industrial waste discharges.

A sewer use by-law has been passed by municipal council; however, a by-law enforcement officer should be retained as there is quite a problem with contaminating wastes gaining access to the storm sewer system.

Kitchener Park Beach was posted by the Medical Officer of Health as unsafe for swimming in July, 1970 and the beach remained closed for the duration of the summer. Close surveillance of beach areas in Orillia should be maintained through bacteriological sampling and examination during the summer months and regulation of posting beach areas

as unfit for swimming should continue to be under the jurisdiction of the Medical Officer of Health.

Accelerated algal and weed growth along the shorelines of Lake Couchiching and Lake Simcoe, especially Kitchener Park Beach, is a major concern. Nutrient input to Lake Simcoe from the municipal water pollution control plant has undoubtedly contributed to this problem. Experimental work using the lime process and other methods for nutrient removal at plants is being carried out by the Ontario Water Resources Commission.

When these studies have been completed much of the data will probably be applicable to many of the sewage treatment plants throughout the Province. There is every likelihood that many municipalities will be required to make a study of their own particular problem to arrive at the method of nutrient removal applicable at their plant before the Newmarket study is completed. It would be anticipated that many municipalities will be retaining the services of a consulting engineer to study specific processes and other associated matters such as availability of chemicals and cost of same.

If the problem of algal and weed growths is to be arrested in the waters receiving the effluent from the

Orillia sewage treatment plant then it is very likely that Orillia will be one of the municipalities required to provide nutrient removal before actual completion of the current OWRC studies.

The sanitary landfill site located west of Mills Creek is well-operated and is considered to be satisfactory in that it does not appear to be a water pollution hazard.

II RECOMMENDATIONS

1. An extensive program to locate and eliminate contaminating wastes gaining access to the municipal storm drainage system should be initiated.
2. Where there are existing industrial waste discharges to the municipal storm drainage system, the offending discharges should be eliminated as directed by the OWRC Division of Industrial Wastes.
3. An officer should be retained to enforce the sewer use by-law and to carry out the program of locating and eliminating contaminated wastes gaining access to the storm sewer system.
4. Ben's Ditch and Mills Creek should be dredged to remove industrial waste sediment and debris to improve the aesthetic quality of the watercourses.

5. The municipality should continue to expedite its program to extend the sanitary sewer system to unserviced areas.

6. The City should anticipate that nutrient removal may be required at the sewage treatment plant before current OWRC studies are completed. It is likely that some of the answers to the problems with nutrient removal will be available before the OWRC studies are finally completed.

7. Public beaches in the Orillia area should be scrutinized closely for bacteriological contamination and posting of a beach as unfit for swimming should continue to be under the jurisdiction of the Medical Officer of Health.

III GENERAL

The City of Orillia with a 1969 assessed population of 21,153 (1970 Municipal Directory) is located in the County of Simcoe on the west side of the confluence of Lakes Simcoe and Couchiching. The municipality comprises approximately 5,300 acres. Before annexation of a portion of the Township of Orillia in 1967, the original Town of Orillia consisted of 2,700 acres with a population of 14,824 (1966 Municipal Directory).

The City of Orillia is well furnished with commercial and industrial firms and its location on Lake Couchiching and Lake Simcoe makes it a popular tourist area.

The topography of the land in the north half of the City and the south-west section is moderately rolling and moderately to steeply sloping. Towards the south-east section the topography is smooth and gently sloping. The soil consists chiefly of glacial till in the form of ground moraine and drumlins. In the northern part, the soil is chiefly sandy loam till, being moderately to very stony. To the south the soil changes to a silty clay loam. Adjacent to Ben's Ditch on the east side there is an area of muck which is well decomposed organic material. Muck also occurs in the area of Victoria Point.

Surface drainage from the municipality flows to three watersheds: to the east, Lake Couchiching; to the south, Lake Simcoe via its tributaries, Ben's Ditch and Mills Creek; and to the north to Silver Creek, a tributary of North River which flows to Georgian Bay.

IV WATER USES

1. Municipal

Water for the City of Orillia is obtained from Lake Couchiching and two drilled wells. Lake Couchiching

is the chief source of supply. The wells are used in the summer with the lake water to lower the temperature of the water. Apparently, twenty-five per cent of the water supplied in the summer months is from the wells.

The pumping capacity of the water treatment plant is 5.2 MGD; however, the filters limit the supply of treated water to 3.6 MGD. Reportedly, if the well water is pumped directly to the distribution system then the treatment plant plus the well pumpage equals about 5.0 MGD. The total available storage is 2,657,500 gallons.

Water from the two sources enters a common wet well where alum, activated carbon (Nuchar) and chlorine is added to the water. Coagulation, sedimentation, and pressure filtration are provided prior to delivery to the distribution system.

In 1969, the average daily pumpage to the system was 2.064 MGD: a maximum daily pumpage of 3.510 MGD occurred in the month of July. The population served by the municipal water works is approximately 20,000 people. There are 64.4 miles of water mains and 5,565 service connections. The Ontario Hospital is not served by the municipal system.

The municipality is proposing to develop a new water filtration plant with Lake Simcoe being the source of supply.

2. Private

(a) Ward's Subdivision - This subdivision consists of 61 houses and is served by a deep well. No treatment is provided.

(b) Ontario Hospital - The source of supply for the hospital is spring water which is chlorinated and pumped directly to the distribution system.

3. Recreational

Lakes Simcoe and Couchiching are used extensively for recreational activities such as swimming, boating and fishing.

V POLLUTION CONTROL

1. Sanitary Waste Disposal

The City of Orillia is served by separate sewer systems. A sanitary sewer system serves the population in the original town area and approximately 1,000 of the additional 4,000 population acquired through annexation. The areas not serviced are located at the outlying regions of Wilson's Point, Heward Point, Victoria Point and northern and western sections of the municipality. These areas

are still served by individual septic-tank systems. There are about 48.12 miles of sanitary sewers. The approximate population on the collector system is 18,000. Construction of trunk sewers to the unserviced areas are proposed by the municipality in a 5-year program.

Domestic wastes are directed via 11 sump and pumping stations to a conventional activated sludge plant of design flow capacity of 4.0 MGD. In 1969, the average daily flow to the plant was 2.56 MGD. Domestic wastes from the Ontario Hospital are also directed to the municipal sewage treatment plant at an estimated flow of 250,000 gpd. The population of the hospital is 3,000.

The final plant effluent is chlorinated and discharged to Mills Creek at a location downstream from where Ben's Ditch enters Mills Creek. Available chemical sample results for 1969 indicated a BOD reduction of 91% and a removal of suspended solids concentration of 93%. The plant efficiency is within the 90 - 95% range expected for this type of treatment plant.

2. Industrial Waste Disposal

Industrial wastes from most of the industries in the municipality are directed to the municipal sanitary sewer system. There are only two industries where problems

have occurred with discharges of contaminating wastes to the storm sewer system and Ben's Ditch. These industries are as follows:

(a) Fahralloy Canada Limited

The Fahralloy Company operates as a foundry in which scrap iron, aluminum dust, chromium, nickel and other additives are melted down and poured into molds or sometimes into "pigs" for future use. The molds are rough formed using reclaimed foundry filler sand. Effluent from the sand reclamation unit was allowed to discharge to Ben's Ditch.

In a 1964 OWRC Industrial Waste Survey it was found that the plant discharge to Ben's Ditch did not meet OWRC requirements (high in suspended solids concentration) and in 1967, a lagoon was constructed to treat the reclamation effluent and the lagoon effluent was to be discharged to the municipal sanitary sewer. A further investigation by the OWRC Division of Industrial Wastes revealed that only 90% of the reclamation unit effluent was being directed to the lagoon and the remaining 10% was overflowing to Ben's Ditch. Consequently, a larger pump and discharge line to the lagoon were installed to eliminate the overflow.

Since 1967, there have been on a few occasions, sand reclamation unit effluent gaining access to Ben's Ditch due to a frozen discharge line, and accidental effluent overflow. In conjunction with the Division of Industrial Wastes, the Fahralloy company has rectified this problem and completely eliminated contaminated discharges to Ben's Ditch.

The reclamation effluent consists mainly of silica sand and appears black in colour as the sand has been charred by heat while being used for molds.

(b) Otaco Limited

Otaco Limited is a producer of mainly metal parts and a foundry-like operation is an integral part of the operation along with painting. The OWRC Division of Industrial Wastes has recommended that the company determine and alleviate the source of high suspended solids concentration in the total plant effluent discharging to the storm sewer. Reportedly, a water-walled paint spray booth is connected to the storm sewer. Also, contents of three paint spray booths and a phosphate cleaner are all dumped on the plant property. During heavy rainfall this contaminating material would

gain access to the storm sewer system. During emergencies such as power failures, a chemically treated coolant system for an induction furnace would not be functional. As a result, municipal water would be utilized for cooling purposes and discharged uncontaminated to Ben's Ditch. The furnace cooling water containing the chemical additive would first be flushed to the sanitary sewer. Here again, this company in conjunction with the OWRC is striving to eliminate the discharge of contaminating wastes to the storm sewer system and Ben's Ditch by directing the wastes to the municipal sanitary sewer system.

3. Refuse Disposal

The sanitary landfill site is located in the portion of land just west of Mills Creek (Ben's Ditch) and north of Lake Simcoe. The area is relatively flat and low-lying and comprises 75 acres covered with brush. The water table is high in the area and consequently the site was approved by the OWRC on the condition that a 2-foot layer of impermeable fill be placed over the dumping area to raise the level of land above the water table. Also a dyke would be placed on the side adjacent to Ben's Ditch. These recommendations have been followed.

Dumping has progressed in a north-westerly direction away from Mills Creek (Ben's Ditch) and Lake Simcoe and the face of the dump is now a considerable distance from the watercourses. On the Mills Creek side, the edge of the landfill area is at least 2 - 300 feet away and 1 - 200 feet on the Lake Simcoe side. Clean fill is bulldozed over the face of the dump first and then refuse is dumped on the fill and covered with fill. Household garbage is dumped at the most extreme end of the dump away from any watercourse; other debris and rubble is dumped on the near side of Ben's Ditch. Burning of refuse and dumping of liquid industrial wastes, except for sand reclamation unit effluent, are not allowed at the site.

At the time of the survey, the operation of the sanitary landfill site appeared to be satisfactory and did not constitute a water pollution problem.

VI SOURCES OF WATER POLLUTION

1. Lake Couchiching Area

a) Storm Sewer System

Bacteriological and chemical results of samples collected from storm sewers and ditches outfalling to Lake Couchiching have indicated that there is a

great deal of domestic sewage gaining access to the storm sewer system. The storm sewers and ditches with discharges of contaminating wastes are described below:

Canice Street Storm Sewer (0-4W)

The samples were collected from the manhole and the bacteriological results showed an excessive coliform count indicative of the presence of domestic sewage.

Neywash Street Storm Sewer (0-3W)

Samples were collected from the ditch at the culvert on the west side of the CNR tracks. The photograph, No. 1, below depicts the condition in the ditch with grease and scum floating on top. A septic smell permeated the area.

Photograph No. 1

Chemical analyses revealed an extremely high BOD and suspended solids concentration. Also, the total coliform and fecal coliform counts were very excessive suggesting the presence of human wastes. During periods of rainfall or runoff, the contents of the ditch would discharge to the lake.

Coldwater Road Storm Sewer (0-2W)

Bacteriological examination showed high total coliform and fecal counts indicative of the presence of domestic sewage.

Mississaga Street Storm Sewer (0-1W)

The 5-day BOD in the discharge and the coliform count were high with the presence of fecal coliforms revealing domestic sewage.

Colborne Street Storm Sewer (0-5W)

The discharge from the storm sewer had excessive BOD and suspended solids concentrations. Also high total and fecal coliform counts were obtained, again indicating domestic sewage.

Cedar Island Road Drainage Ditch

As shown on the enclosed map, this ditch drains the area of Cedar Island Road; Lakeview

Crescent; Millard, Gill and Church Streets; Queen and Front Streets; and Atherley Road North. Bacteriological and chemical samples collected from this ditch showed coliform counts and 5-day BOD's indicative that domestic sewage is gaining access to this watercourse.

Queen Street Storm Sewer (LCS-7DW)

This storm sewer outfalls to the above drainage ditch east of Front Street. The 5-day BOD and suspended solids concentration in the discharge and the high fecal coliform count obtained, indicated domestic sewage is gaining access to the storm sewer.

b) Lake Couchiching

Bacteriological samples collected from Lake Couchiching near the outfalls of the storm sewers north of the government dock at Mississaga Street contained high coliform densities making this area questionable for swimming purposes.

A bacteriological sampling program carried out by the Simcoe County Health Unit during the summer of 1970 indicated the bacteriological water quality of Lake Couchiching to be generally satisfactory.

However, on one occasion on July 6, 1970, samples collected in the area of the Coldwater and Neywash storm sewer outfalls revealed fecal coliform counts of 1,000+ indicating that domestic sewage is gaining access to this area and thereby making this area unsafe for swimming.

2. Ben's Ditch - Mills Creek

A bacteriological sample (MBD-1.33) collected from Ben's Ditch at the CNR tracks behind Fahralloy showed an excessive coliform count. A fecal coliform count was also obtained indicating that domestic wastes were introduced into the ditch upstream. The ditch receives drainage from the municipal storm sewer from Wyandotte Street and Barrie Road. Also, overflow from the sand reclamation unit at Fahralloy used to be discharged to the ditch. The ditch bed did not appear to have any blackish sediment on the bottom; however, there was staining of stones on the bottom.

The discharge from the Queen Street West storm sewer (MBD-1.33W) just downstream from the above sampling location appeared to be typical of storm drainage.

A sample collected from the Dunedin Street storm sewer (MBD-1.0W) outfalling to Ben's Ditch contained excessive coliform bacteria with fecal coliforms indicating

that domestic sewage is gaining access to this storm sewer.

Ben's Ditch also receives storm drainage from a storm sewer pumping station located on James Street West. The condition of this tributary to Ben's Ditch is pictured below in photograph No. 2.

Photograph No. 2

The aquatic growth in the drainage ditch appeared to be completely covered with blackish material; as well, the water in the ditch appeared to be generally black because of the black sediment on the bottom. In the photo the white retaining wall at the pumping station

is stained greyish to blackish. This is an indication that foundry wastes, of black silica sand, are being discharged to Ben's Ditch at this location. A bacteriological sample (MBDT-1.1) collected downstream from the pumping station contained a high coliform count with the presence of fecal coliforms.

A ditch (MBDT-1.1D) located to the south of the storm sewer pumping station and discharging to the pumping station receives contaminating wastes at a location behind Curtis Beverages. Samples of the drainage prior to entry into the pumping station showed excessive total coliform and fecal counts indicating domestic sewage is discharged to the ditch.

A bacteriological sample (MBD-0.4) collected from Ben's Ditch downstream at the Trans Canada By-Pass revealed an excessive coliform count. The photograph, No. 3,

Photograph No. 3

shows an example of the blackish sediment on the bottom of the ditch. The photo depicts the blackish appearance of the ditch. Analyses of the sediment revealed a high silica (SiO_2) concentration, a main constituent of sand used in foundries.

Downstream from the Trans Canada By-Pass, Ben's Ditch joins Mills Creek. The creek flows in an easterly direction and then south at the confluence with Ben's Ditch. A bacteriological sample (M-0.95) collected from Mills Creek at Highway 11B contained a high coliform count with fecal coliforms. The creek at this location appeared to be quite clear.

A sample (M-0.34), collected from Mills Creek downstream from the confluence with Ben's Ditch and 100 feet upstream from the Orillia Water Pollution Control Plant effluent outfall, again revealed excessive coliform bacteria and fecal coliforms indicating the water is contaminated.

Bacteriological and chemical samples (M-0.32T) were collected of the final effluent from the water pollution control plant. The chemical results showed a satisfactory suspended solids concentration of 5 ppm, well within the Commission's limit of 15 ppm. Although the sample being tested had been depleted, it is believed that the 5-Day BOD was also within the permissible limit.

Below is a picture, photograph No. 4, of the final effluent which appeared quite clear at the time of the survey.

Photograph No. 4

Bacteriological examination of the final effluent showed a high coliform count although a chlorine residual of 1.0 ppm is maintained in the final effluent.

In contrast to the adverse sample results obtained from Mills Creek and Ben's Ditch upstream from the water pollution control plant, the bacteriological samples collected 100 feet downstream (M-0.30) from the plant and at the municipal dump site access road (M-0.10) showed that the bacteriological quality of the water was satisfactory

downstream from the plant. Samples (LCS-17.0) collected at the mouth of Mills Creek where it enters Lake Simcoe also indicated a satisfactory bacteriological quality with a coliform count of less than 4.

The results of a bacteriological sampling program (Table IV) carried out by the Orillia Light, Water and Power Commission also showed that the total coliform count in Mills Creek downstream from the Orillia Water Pollution Control Plant had decreased appreciably compared to the bacterial count found upstream from the plant. This decrease in the coliform count downstream is due to the effect of chlorine introduced in the stream from the water pollution control plant.

Chemical analyses of a sample collected at the mouth of Mills Creek revealed a high 5-day BOD of 3.5 ppm. The BOD in the creek at this point is high due to the organic material gaining access to Ben's Ditch and Mills Creek and some of this material is settling at the mouth and depleting the dissolved oxygen in the water. The photograph, No. 5, below shows the mouth of Mills Creek with blackish, settled material.

Photograph No. 5

3. Lake Simcoe - Kitchener Park Beach

Bacteriological samples (LCS-16 and LCS-18) collected from Lake Simcoe east and west of the mouth of Mills Creek indicated that the bacteriological water quality was satisfactory. Also samples collected from Kitchener Park Beach at the time of the survey indicated the water to be bacteriologically safe for swimming purposes.

However, in July, 1970, a bacteriological sampling program conducted by Simcoe County Health Unit revealed coliform counts in excess of the safe limit for swimming. Consequently, Kitchener Park Beach was

posted by the Medical Officer of Health as unfit for swimming and the beach remained closed for the duration of the summer.

Another problem at Kitchener Park Beach was the occurrence of an abundant growth of algae. The photograph, No. 6, below shows the extent of the algae growth by the amount being washed up onto the shore.

Photograph No. 6

The algae deteriorates the aesthetic qualities of the beach and when the algae decomposes a foul odour is emitted.

The abundant growth of algae in this area is

accelerated by nutrient enrichment from drainage from Mills Creek and Ben's Ditch. Domestic sewage is a rich source of nutrients. Nutrients are being introduced to Ben's Ditch via the municipal storm drainage system and water pollution control plant. The main source of nutrients is the water pollution control plant final effluent. The reason being is that conventional sewage treatment does not appreciably remove algal nutrients - nitrogen and phosphorus. The basic objectives of conventional sewage treatment are to reduce suspended solids, BOD and micro-organisms to an acceptable range for discharge.

VII PREVIOUS REPORT RECOMMENDATIONS

A water pollution survey conducted in August, 1964 contained three recommendations as follows:

1. A concerted effort be made by the Town of Orillia and the industries involved to fulfill the recommendations contained in the Industrial Waste Survey report.
2. Mills Creek and its tributary Ben's Ditch be dredged to remove unnatural deposits and where necessary regraded.

3. The storm sewer system be checked for illegal connections and remedial measures taken to prevent the discharge of polluting wastes from the storm sewer outlets in excess of the permissible limits.

The first recommendation has been implemented accordingly in that industrial wastes which were being discharged to Ben's Ditch are now being directed to the municipal sanitary sewer system. Known sources of industrial waste discharges to Ben's Ditch are being eliminated as recommended by the OWRC Division of Industrial Wastes.

As for the second recommendation of dredging Mills Creek and Ben's Ditch, the municipality has deferred this work. The city plans to construct a collector sewer and sewage pumping station in the area of Ben's Ditch at St. James Street West. Dredging and regrading of Ben's Ditch would be done after construction.

The third recommendation that illegal connections to the storm sewer system be located and eliminated has not been implemented. The storm drainage study and report recently completed for the City of Orillia does not include information on sources of illegal connections.

VIII COMMENTS

A major source of pollution in the municipality is domestic sewage gaining access to the storm sewer system. This is occurring on a large scale basis as visual inspection and sample results have shown this in the report. The water pollution survey conducted in 1964 also pointed out that contaminating wastes were gaining access to the storm sewers and it was recommended that illegal connections to storm sewers be located and eliminated. Conditions have remained somewhat the same.

The City of Orillia has recently passed a sewer use by-law; however, for it to be worthwhile and constructive, a by-law enforcement officer would be required. It appears that a great deal of work is needed to locate sources of polluting wastes, including industrial as well as domestic, gaining access to the storm sewers as it may encompass the entire storm sewer system.

Another major concern in the municipality is the condition of Ben's Ditch and Mills Creek. Bacteriologically, Ben's Ditch and Mills Creek are polluted especially upstream from the municipal water pollution control plant. This is due to domestic wastes and not industrial wastes. The black appearance of the creek and ditch is due to the settled charred

silica sand used in the foundries. Although wastes from the sand reclaimer units are not to be discharged to Ben's Ditch, there is a possibility that this type of waste is still being discharged to the ditch via the St. James Street West storm sewer pumping station. An extensive program to eliminate discharges of polluting wastes to Ben's Ditch and dredging of Ben's Ditch and Mills Creek would vastly improve the condition of these watercourses.

Kitchener Park Beach was closed to the public during the summer because of high bacterial counts indicating the seriousness of the problem of contaminating wastes entering Mills Creek.

There is also the problem that algal growth in the area of Kitchener Park Beach and Shannon Bay has been accelerated by the nutrient input to the lake from the municipal sewage treatment plant. Pilot plant studies for phosphorus removal are in progress. Information obtained from this work may be applied to the Orillia water pollution control plant. The municipality should then consider the early provision for nutrient removal.

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TABLE 1

LAKE COUCHICHING - STORM SEWER OUTFALLS

SAMPLING POINT NUMBER	DESCRIPTION	DATE	5-DAY BOD (PPM)	SOLIDS (PPM) TOTAL	SUSP.	DISS.	ANIONIC DETERGENTS AS ABS	PHENOLS IN PPB	ETHER SOLUBLES	COLIFORM BACTERIA /100 ML	FECAL COLIFORMS
O-1 W	STORM SEWER - MANHOLE AT MISSISSAGA STREET	AUG. 13/70	18.	350	5	345	0.1	12	3	26,000	340
O-2 W	STORM SEWER - MANHOLE AT COLDWATER ROAD	AUG. 13/70	13.	580	5	575	0.4	12	3	390,000	72,000
O-3 W	STORM SEWER - CULVERT AT NEYWASH STREET	AUG. 13/70	480.	910	110	800	5.4	25	44	48,000,000	1,000,000
O-4 W	STORM SEWER - MANHOLE AT CANICE STREET	AUG. 13/70	2.0	470	5	465	0.1	0	**	119,000	544
O-5 W	STORM SEWER - AT COLBORNE STREET	AUG. 13/70	90.	590	25	565	3.6	50	31	1,200,000	9,000
LCS-7 D	DRAINAGE DITCH AT LAKEVIEW CR.	AUG. 13/70	7.5	660	10	650	0.1	0	TRACE	58,000	1,200
LCS-7 D-1	DRAINAGE DITCH AT CEDAR ISLAND ROAD	AUG. 13/70	6.0	620	10	610	0.1	4	TRACE	29,000	660
LCS-7 DW	STORM SEWER AT QUEEN STREET - EAST OF FRONT STREET	AUG. 13/70	20.0	550	15	535	1.1	12	7	580,000	28,000

TABLE II

LAKE COUCHICHING - LAKE SAMPLING

SAMPLING POINT NUMBER	DESCRIPTION	DATE	5-DAY BOD (PPM)	SOLIDS (PPM) TOTAL	SUSP.	DISS.	ANIONIC DETERGENTS AS ABS	PHENOLS IN PPB	ETHER SOLUBLES	COLIFORM BACTERIA /100 ML	FECAL COLIFORMS
LCS-3	LAKE COUCHICHING OPPOSITE CANICE STREET	AUG. 13/70	2.0	230	35	195	0.0	0	**	7,000	300
LCS-4	LAKE COUCHICHING OPPOSITE NEYWASH STREET	AUG. 13/70	1.2	150	5	145	0.0	0	**	1,300	40
LCS-5	LAKE COUCHICHING OPPOSITE COLD WATER ROAD	AUG. 13/70	1.2	170	5	165	0.0	0	**	2,400	116
LCS-6	LAKE COUCHICHING OPPOSITE MISSISSAUGA STREET	AUG. 13/70	3.0	220	5	165	**	0	TRACE	5,700	160
LCS-6A	LAKE COUCHICHING OPPOSITE COLBORNE STREET	AUG. 13/70	1.6	180	5	175	0.0	0	0	56	12

TABLE III

BEN'S DITCH - MILLS CREEK - OUTFALL AREA STREAM QUALITY RESULTS

SAMPLING POINT NO.	DESCRIPTION	DATE	5-DAY BOD (PPM)	SOLIDS (PPM) TOTAL	SUSP.	DISS.	ANIONIC DETERGENTS AS ABS	PHENOLS IN PPB	ETHER SOLUBLES	COLIFORM BACTERIA	FECAL COLIFORMS
MBD-1.33	BEN'S DITCH BEHIND FAHRALLOY UPSTREAM FROM QUEEN STREET STORM SEWER	8/14/70	1.0	350	5	175	0.1	0	**	6,200	80
MBD-1.33 W	QUEEN STREET STORM SEWER DISCHARGE	8/14/70	1.4	320	5	315	0.1	0	**	1,500	<4
MBD-1.0 W	DUNEDIN ST. STORM SEWER	8/13/70	1.2	550	5	545	0.1	0	**	14,000	288
MBDT-1.1 D	DRAINAGE DITCH FROM CURTIS BEVERAGES	8/14/70	4.5	640	10	630	0.1	0	5	21,000	1,000
MBDT-1.1	BEN'S DITCH TRIBUTARY DOWNSTREAM FROM JAMES ST. STORM SEWER PUMPING STATION	8/14/70	3.0	360	5	355	0.0	0	3	2,800	410
MBD-0.4	BEN'S DITCH AT TRANS-CANADA BY-PASS	8/14/70	3.0	430	25	405	0.1	0	TRACE	8,000	820
M-0.95	MILLS CREEK AT HWY. 11B UPSTREAM FROM JCT. WITH BEN'S DITCH	8/14/70	1.0	230	5	225	0.1	0	**	3,600	160
M-0.34	MILLS CREEK 100' UPSTREAM FROM ORILLIA WPCP OUTFALL	8/14/70								9,000	1,000
M-0.32 T	ORILLIA WPCP SEWER OUTFALL	8/14/70	***	510	5	490	0.1	3	**		
M-0.30	MILLS CREEK 100' DOWNSTREAM FROM ORILLIA WPCP OUTFALL	8/14/70								100	<4
M-0.10	MILLS CREEK AT DUMP ACCESS ROAD	8/14/70	***	480	10	470	0.1	3	**	100	<4
LCS-17.0	MILLS CREEK AT LAKE SHORE	8/14/70	2.0	420	5	415	0.1	0	3	<4	<4

TABLE III
(CONTINUED)

BEN'S DITCH - MILLS CREEK - OUTFALL AND STREAM SAMPLE RESULTS

SAMPLING POINT NUMBER	DESCRIPTION	DATE	HARDNESS AS $CaCO_3$	ALKALINITY AS $CaCO_3$	IRON AS Fe	CHLORIDE AS Cl	pH AT LAB	CALCIUM AS Ca	NITROGEN AS N				PHOSPHORUS AS P	
									FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE	TOTAL	SOLUBLE
MBD-0.4	BEN'S DITCH AT TRANS-CANADA BY-PASS	8/14/70	288	253	1.15	51	7.9	99	**	7.0	**	**	4.9	**
M-0.32 T	ORILLIA WPCP SEWER OUTFALL	8/14/70	256	217	0.20	73	7.4	90	1.0	2.5	.09	7.9	6.0	5.6
M-0.10	MILLS CREEK AT DUMP ACCESS ROAD	8/14/70	200	228	2.5	66	7.5	91	2.1	2.5			4.4	4.0

TABLE IV

BACTERIOLOGICAL SAMPLING PROGRAM OF MILLS CREEK
CARRIED OUT BY THE ORILLIA LIGHT, WATER AND POWER COMMISSION

DATE SAMPLED	SAMPLE TAKEN UPSTREAM FROM THE WPCP OUTFALL		SAMPLE TAKEN DOWNSTREAM FROM THE WPCP OUTFALL	
	Total Coliform Organisms	Fecal Coliform Organisms	Total Coliform Organisms	Fecal Coliform Organisms
May 14/70	7,500	4,100	620	620
May 20	420	120	90	0
May 27	3,800	1,200	850	260
June 3	4,200	3,800	30	0
June 10	28,000	6,000	10	10
June 16	7,000	5,000	2,000	700
June 23	13,100	9,000	80	20
June 30	11,900	5,000	60	30
July 8	12,200	2,400	30	10
July 17	8,700	1,000	50	20
July 17	5,100	1,200 (Hwy. Culvert)	20 (Dump Bridge)	20
July 23	7,500	420	30 (Dump Bridge)	10
July 23	11,600	2,200 (Hwy. Culvert)	680	40
July 29	200,000	53,000	600 (Dump Bridge)	10
July 29	6,000	500	1,800	38
Aug. 6	500	90	310	40
Aug. 6	700 (Hwy. Culvert)	80	0 (Dump Bridge)	0
Aug. 13	3,300 (Hwy. Culvert)	300	30	0
Aug. 13	15,000	500	10	0
Aug. 18	5,000	2,000	20	20
Aug. 18	3,000	1,200 (Hwy. Culvert)	30 (Dump Bridge)	10
Aug. 28	4,900	1,500	0 (Dump Bridge)	0
Aug. 28	8,000	1,800 (Hwy. Culvert)	20	20
Sept. 1	1,300	500	20	20
Sept. 1	1,200	500 (Hwy. Culvert)	0 (Dump Bridge)	0
Sept. 2	1,000	600	0 (Dump Bridge)	0
Sept. 2	2,200 (Hwy. Culvert)	800	0	0

TABLE V

LAKE SIMCOE - KITCHENER PARK BEACH SAMPLE RESULTS

SAMPLING POINT NO.	DESCRIPTION	DATE SAMPLED	5-DAY BOD (ppm)	SOLIDS (ppm) Tot.	Susp.	Diss.	ABS for Detergent ppb	PEHNOLS in ppb	ETHER SOLUBLE	COLIFORM BACTERIA /100 ml	FECAL COLIFORM /100 ml
LCS-18	Lake Simcoe west of mouth of Mills Creek	8/14/70								<4	<4
LCS-17	Mouth of Mills Creek	8/14/70	3.5	420	5	415	0.1	3	2	<4	<4
LCS-16	Lake Simcoe east of mouth of Mills Creek	8/14/70								130	30
LCS-15A	Kitchener Park Beach area west	8/14/70								50	<4
LCS-15	Kitchener Park Beach area central	8/14/70	2.0	220	5	215	0.1	0	3	80	28
LCS-15B	Kitchener Park Beach area east	8/14/70								100	<4

APPENDIX I

WATER QUALITY AND EFFLUENT OBJECTIVES

The OWRC objectives for surface waters is described in a booklet entitled "Guidelines and Criteria for Water Quality Management in Ontario". A copy of the booklet is enclosed in the pocket on the back cover of this report. This publication contains the guidelines and introduces water quality criteria for various uses including public, agricultural and industrial water supply, recreation, aesthetic enjoyment and the propagation of fish and wildlife. The guidelines should be followed to determine the acceptability of a watercourse for various uses.

A few pertinent maximum limits of contaminants in sewage treatment plant and industrial effluents are listed below. Adequate protection for surface waters except in certain specific instances influenced by local conditions, should be provided if the following concentrations and pH range are not exceeded.

5-day BOD - not greater than 15 ppm
Suspended Solids - not greater than 15 ppm
Phenols - not greater than 20 ppb
pH - 5.5 to 10.6
Iron - not greater than 17 ppm
Ether Solubles (Oil) -not greater than 15 ppm

GLOSSARY OF TERMS

Bacteriological Examinations - The Membrane Filter Technique is used to obtain a direct count of coliform organisms. These organisms are the normal inhabitants of the intestines of man and other warm-blooded animals. They are always present in large numbers in untreated sewage and are, in general, relatively few in number in other stream pollutants.

Biochemical Oxygen Demand (BOD) - The biochemical oxygen demand test indicates the amount of oxygen required for stabilization of the decomposable organic matter found in sewage, sewage effluent, polluted waters, or industrial wastes, by aerobic biochemical action.

Solids - The analyses for solids include tests for total, suspended and dissolved solids. The total solids is a measure of the solids in solution and in suspension. Suspended solids indicate the measure of undissolved solids of organic or inorganic nature whereas the dissolved solids are a measure of those solids in solution.

Oils and Ether Soluble Materials - These include oils and all other soluble materials such as tarry substances and greases. The presence of these pollutants renders water difficult and sometimes impractical to treat either for industrial or domestic use. Oils make streams unsightly and water unfit for bathing.

Phenolic Compounds - The presence of phenol or phenolic equivalents is generally associated with discharges containing petroleum products, or with wastes from some industries. It is generally conceded that adequate protection of surface waters will be provided if the concentration of phenols in waste discharges does not exceed 20 parts per billion (ppb). Phenolic type waste can cause objectionable conditions in water supplies and might taint the flesh of fish.

Alkyl Benzene Sulfonate (ABS) - The alkyl benzene sulfonate portion of the anionic detergents is reported in ppm. The test is generally employed to indicate the presence of domestic wastewater. The popular use of synthetic detergent for general cleaning purposes have resulted in the incidence of residual ABS in streams. As an objective, the ABS concentration should not exceed 0.5 ppm in water used for domestic purposes.

Iron - Water for domestic use should contain less than 0.3 parts per million of iron in order to avoid objectionable tastes, staining and sediment formation. Iron concentrations of not greater than 17 parts per million in waste discharges should permit adequate protection of surface waters.

Nitrogen

Ammonia Nitrogen or sometimes called free ammonia is the insoluble product in the decomposition of nitrogenous

organic matter. It is also formed when nitrates and nitrites are reduced to ammonia either biologically or chemically. Some small amounts of ammonia, too, may be swept out of the atmosphere by rain water.

The following values may be of general significance in appraising free ammonia content: Low 0.015 to 0.03 ppm; moderate 0.03 to 0.10 ppm; high 0.10 or greater.

Total Kjeldahl is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia Nitrogen measures the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

Nitrite Nitrogen

Nitrite is usually an intermediate oxidation of ammonia. The significance of nitrites, therefore, varies with their amount, sources, and relation to other constituents of the sample, notably the relative magnitude of ammonia and nitrite present. Since nitrite is rapidly and easily converted to nitrate, its presence in concentrations greater than a few thousandths of a part per million is

generally indicative of active biological processes in the water.

Nitrate Nitrogen

Nitrate is the end product of aerobic decomposition of nitrogenous matter, and its presence carries this significance. Nitrate concentration is of particular interest in relation to the other forms of nitrogen that may be present in the sample. Nitrates occur in the crust of the earth in many places and are a source of its fertility.

Phosphorus

Total Phosphorus - Total Phosphorus is a measure of both the organic and inorganic forms of phosphorus present.

Soluble Phosphorus - Soluble Phosphorus is a measure of the orthophosphate only and when subtracted from the total phosphorus gives an indication of the concentration of organic phosphorus present. That is, the soluble phosphorus is a measure of the inorganic phosphorus present, except the phosphorus in the form of polyphosphate, which however, in surface waters is usually insignificant. Inorganic phosphorus in concentration in excess of 0.01 ppm may cause nuisance conditions.

APPENDIX II

IMPLEMENTATION OF WATER AND SEWAGE WORKS PROGRAMS

Currently, there are three general methods which may be utilized for implementing sewage and water works programs. These are: 1) to enter into an agreement with the OWRC for the construction of the treatment and collector works with an obligation to pay the debt retirement and operating charges over the term of the agreement with the facility reverting to the municipality at the end of the term of the agreement, 2) by requesting the provision of service from a Provincially-owned project, and 3) by proceeding with the construction independently and meeting capital costs by the sale of debentures.

OWRC/MUNICIPAL PROJECTS

For the construction of water and sewage works under agreement with this Commission, the works are provided and developed under Sections 39 to 46 of the Ontario Resources Commission Act.

For this type of arrangement, the Commission utilizes a sinking fund and consequently the annual payments are based on a specific debt retirement period and the payments are unchanged for the period of the agreement. This type of project may be financed over a period of time up to a maximum

of thirty years. The annual charges for projects constructed under this agreement are determined as follows:

1. Capital Repayment

   As noted, OWRC financing is by the sinking fund method and an annual payment of approximately 2 per cent of the capital cost is required to retire a debt over a thirty-year period.

2. Interest

   On new Commission projects, interest is calculated at the current rate.

3. Reserve Fund

   To provide money for repairs and replacements, Section 40 of the Ontario Water Resources Commission Act provides for the establishment of a reserve fund by the Commission. It is important to note that this fund is established in the name of the municipality and the balance consequently earns interest. It has now been established by Commission minute that the reserve fund billing for each project shall continue only until the fund reaches an amount of ten times the initial annual billing and the reserve fund billing shall be re-imposed only when the fund has been depleted to 80 per cent or less of the maximum amount.

4. Operating Costs

Under OWRC agreement, the municipality is responsible only for the operating costs directly attributed to the project in the municipality. Therefore, no charges are made by the Commission for the services of head office personnel who are available as required to advise on the satisfactory operation and maintenance of the project.

PROVINCIALLY-OWNED PROJECTS

In June, 1967, the Honourable J. R. Simonett, Minister of Energy and Resources Management, made an announcement which expanded the authorization of this Commission for the provision of water supply and sewage treatment facilities. This new program allows the Commission to construct entire water and sewage works facilities for small municipalities. The capital costs of these can be amortized over a 40 year period.

A slight variation of this program could be implemented in that the municipality may request that this Commission provide only the major water and sewage works facilities as Provincially-owned works, and develop the water distribution and sewage collector systems under the

standard type of Commission project. It would appear that where applicable, it would be more advantageous for the municipality to proceed on the basis of requesting this Commission to develop entire systems as Provincially-owned works.

The associated cost of supplying these works, including amortization of capital costs, together with operating and maintenance charges, will be recovered by the sale of service to the affected municipalities by rates determined on a usage basis. These facilities will be wholly-owned by the Province of Ontario and the arrangements for service will be formalized by contracts between the Commission and the municipality concerned. The installations will be operated entirely at cost with appropriate provision for adjustment in rate.

DEVELOPMENT

If a municipality, after considering the alternatives, wishes this Commission to consider Provincially-financed projects, application forms should be completed and submitted together with a resolution of the Municipal council. A draft of the suggested wording of the resolution is included with the application forms.

If the proposed works are to be built by the municipality on its own initiative or as a formal project under agreement with this Commission, it is required that the Council retain a consulting engineer to prepare preliminary engineering reports on the proposed work. If a Provincial system is contemplated, no action should be taken with respect to retaining a consulting engineering firm as the Commission will designate a consulting engineer to carry out the Provincial portion of the work and it would be advantageous if the municipal portion be studied and reported on by the same engineer.

LEGEND

LCS-1 – LAKE COUCHICHING AND LAKE SIMCOE SAMPLING POINTS WHERE SAMPLES WERE COLLECTED BY THE O.W.R.C.

M-0.95 – MILL CREEK AND TRIBUTARY SAMPLING POINTS, STREAM AND MILEAGE FROM MOUTH.

W-0.32 T – MUNICIPAL SEWER OUTFALLS – TYPE OF OUTFALL

T – TREATED SEWAGE

W – STORM SEWER

I – INDUSTRIAL SEWER

D – DRAINAGE DITCH

INDUSTRIAL SITES

A – DOMINION DAIRIES LTD. AND ORILLIA CREAMERY CO. LTD.
B – CANADA WOOD SPECIALTY CO.
C – PORCELAIN AND METAL PRODUCTS
D – TUSHOPE SPECIALTIES LTD.
E – ORILLIA TOOL AND STAMPINGS LTD.
F – HURL'S DAIRY LTD.
G – TOOLS AND HARDWARE LTD.
H – CANADA ELECTRIC CASTINGS LTD.
I – FAHR-ALLOY CANADA LTD.
J – VOLLANS INDUSTRIES LTD.
K – OTAGO LTD.
L – DORR-OLIVER LONG CO.
M – CURTIS BEVERAGES LTD.
N – ORILLIA WATER POLLUTION CONTROL PLANT
O – A.J. LLOYD
P – HEYWOOD-WAKEFIELD CO. OF CANADA
Q – THERMAX
R – TRENT VALLEY BAKERIES

ONTARIO WATER RESOURCES COMMISSION

CITY OF ORILLIA
WATER POLLUTION SURVEY
1970

SCALE : 1320 0 1320 1980 FT.

DRAWN BY : L.L BROOME | DATE : NOVEMBER 1970

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